Remarks

Summary

Claims 1-5, 10, 11, 14-16, 19-29, 35-40 and 47-68 are currently pending. Claims 1-5, 10, 11, 14-16, 19-29, 35 and 68 are withdrawn as required by this or a previous restriction. Claims 36, 39, 47 and 48 are currently amended. Claims 37, 38, 49, and 50-67 are previously presented. Claim 40 is original. No new claims are added. Support for Applicants' amendments can be found throughout the specification, for example, on pages 5 and 6 and in Figure 1. No new matter has been entered.

Claims 36-40 and 47-67 are rejected under 35 U.S.C. 112, second paragraph, as indefinite for allegedly failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Claims 36-38, 40 and 67 are rejected under 35 U.S.C. 102(b) as allegedly anticipated by Manger et al.

Claims 36, 39, 47-51, 53-55 and 58-59 are rejected under 35 U.S.C. 102(e) as allegedly anticipated by Zhu et al.

Claim 39 is rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Manger et al., as applied to claim 36, in view of Brown et al.

Claims 52 and 60-66 are rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Zhu et al. in view of Braun further in view of Brown et al.

Claims 56 and 57 are rejected under 35 U.S.C 103(a) as allegedly unpatentable over Zhu et al. in view of Glezer et al.

Rejections under §112

Claims 36-40 and 47-67 are rejected under 35 U.S.C. 112, second paragraph, for allegedly failing to particularly point out and distinctly claim the subject matter that Applicants regard as the invention. Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

Claim 36 is rejected as allegedly vague because the preamble of the claim recites a method for identifying the presence of a pathogenic agent while the body of the claim does not recite identification of a pathogenic agent. Applicants maintain the arguments of record and contend that the claims are sufficiently clear to allow one of skill in the art to readily appreciate the metes and bounds of the claimed invention. Nevertheless, to expedite prosecution, Applicants have amended claims 36 and 47 to more particularly point out the claimed invention. Applicants' amendments to claims 36 and 47 are believed to improve the clarity of the claims, thereby obviating this rejection.

Additionally, Applicants have amended claim 36, at lines 5 and 9, to change "a pathogenic agent" to "the pathogenic agent." Applicants' amendment is made solely for clarity and does not narrow the scope of the claim which encompasses the use of any of a wide range of biological data to identify any of a wide range of pathogenic agents.

In view of Applicants' amendments and remarks, reconsideration and withdrawal of the rejection under 35 U.S.C. 112, second paragraph, is respectfully requested.

Rejections under §102(b)

Claims 36-38, 40 and 67 are rejected under 35 U.S.C. 102(b) as allegedly anticipated by Manger et al. Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

Applicants maintain the arguments of record. Manger et al. fail to teach or suggest methods for identifying a pathogenic agent. In particular, Manger et al. fail to teach or suggest methods for identifying a pathogenic agent in an automatic fashion. Furthermore, Manger et al. fail to teach or suggest methods of identifying a pathogenic agent using, for example, methodologies of information fusion and/or machine learning understood by skilled practitioners in the art. Nevertheless, to expedite prosecution, Applicants have amended the claims to more particularly point out certain embodiments of Applicants' invention. Applicants' amendments are not in acquiescence to the rejection. Applicants reserve the right to prosecute claims of similar or differing scope.

Amended claim 36 is directed to a method of identifying a pathogenic agent. The method includes collecting biological data representative of a biological response to the pathogenic agent

and applying machine learning to process automatically substantially all of the biological data and to develop a signature for the pathogenic agent. The method also includes employing information fusion to combine automatically information from at least one source. The source may be the biological response, the biological data, machine learning processed biological data or the signature.

As stated in the MPEP §2131, "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Manger et al. fail to satisfy these criteria, and thus Manger et al. fail to undermine the patentability of claims 36-38, 40 and 67.

The Office Action states that Manger et al. teach a method for identifying the presence of a pathogenic agent. Applicants respectfully disagree with the Examiner's assertion. As noted in our previous response, Manger et al. merely teach gene expression responses to infection. In essence, Manger et al. merely observe the way in which host cells respond to infection. In contrast, the methods of the present invention permit the automatic identification of a pathogenic agent based on analysis of the pathogenic signature generated upon infection of host cells with the pathogenic agent: "applying machine learning...to develop a signature for the pathogenic agent." Manger et al. briefly mention the "identification of diagnostic signatures." (See Page 217, Col. 1). However, the diagnostic signatures in Manger et al. are not developed by applying machine learning to biological data, as recited in independent claim 36. Moreover, the signatures in Manger et al. are not developed by applying machine learning to process automatically substantially all of the biological data, as recited in independent claim 36. Finally, the diagnostic signatures of Manger et al. are not developed automatically from substantially all of the biological data, as recited in independent claim 36.

Next, Manger et al. do not disclose applying machine learning automatic training to "process automatically...the biological data" and "employing information fusion to automatically combine information." Manger et al. remark that "...the identification of diagnostic signatures among host response profiles will require the examination of a wide variety of naturally occurring strains and species, and application of two-way clustering across all genes as well as microbial stimuli." (Page 217, col. 1, Par. 2). Manger et al. further state that "cluster analysis" can "provide the ability to

reveal structure within a mass of array data." (See Page 21, Col. 1, Par. 1). The mere mention of "cluster analysis" or "two-way clustering" in the above sentences do not anticipate machine learning automatic training, the use of such trained machine learning for the automatic identification of pathogenic agents, and information fusion techniques for this automatic identification of pathogenic agents, as recited in Applicants' claims. Moreover, these remarks in the Manger et al. reference do not teach or suggest elements of the claimed invention directed to "automatically process[ing] biological data" or "employ[ing] information fusion to automatically combine information." Yet, these are elements of claim 36. The remarks in Manger et al. simply suggest that scientists look at the data obtained from response profiles and draw a conclusion that certain portions of the data appear clumped or clustered together ("response profiles will require examination"). This teaching is insufficient to undermine the patentability of the claimed invention. Merely noting that data "require examination" in no way teaches or suggests the claimed methods.

Manger et al. fail to teach or suggest each and every element of the claimed invention as recited by, for example, independent claim 36. Thus, Manger et al. fail to satisfy the requirements necessary to anticipate the claimed invention. Dependent claims 37-38, 40, and 67 further limit claim 36, and are neither taught nor suggested by Manger et al. In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of this rejection.

Rejections under §102(e)

Claims 36, 39, 47-51, 53-55 and 58-59 are rejected under 35 U.S.C. 102(e) as allegedly anticipated by Zhu et al. Applicants traverse this rejection to the extent it is maintained in light of the amended claims.

Applicants maintain the arguments of record. Zhu et al. fail to teach or suggest methods for identifying a pathogenic agent. Furthermore, Zhu et al. fail to teach or suggest methods of identifying a pathogenic agent using, for example, methodologies of information fusion and/or machine learning understood by skilled practitioners in the art. Nevertheless, to expedite prosecution, Applicants have amended the claims to more particularly point out certain embodiments of Applicants' invention. Applicants' amendments are not in acquiescence to the rejection. Applicants reserve the right to prosecute claims of similar or differing scope.

As stated in MPEP §2131, "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Zhu et al. fail to satisfy these criteria, and thus Zhu et al. fail to undermine the patentability of claims 36, 47-51, 53-55, and 58-59.

Applicants previously presented arguments that Zhu et al. fail to describe applying machine learning or that machine learning involves automatic learning. The Office Action (page 13) rejects Applicants' arguments and states that "no definitions [of machine learning consisting of algorithms that learn automatically] are recited in the rejected claims...or are dictionary definitions." Applicants point out, as an example, that a reputed journal – "Nature"[1] defines Machine Learning (especially for bioinformatics) as "the ability of a program to learn from experience — that is, to modify its execution on the basis of newly acquired information." In addition to providing this well known definition, Applicants have amended claims 36 and 47 to more particularly recite "applying machine learning to process automatically substantially all of the biological data." Recitation of "processing automatically" highlights an important feature of machine learning algorithms to learn automatically from the biological data and to develop a signature.

Zhu et al. fail to teach or suggest applying machine learning. The comparison of control samples in Par. 0114 of Zhu et al. is in no way similar to applying machine learning. The intensities produced by the control samples and test samples are not machine learning generated signatures. Zhu et al. do not mention machine learning or any other term referring to a technique to process automatically substantially all of the biological data and to develop a signature. Nowhere in Zhu et al. is there any teaching or suggestion for applying machine learning to process automatically substantially all of the biological data and to develop a signature for the pathogenic agent, as required by the pending claims.

Given that Zhu et al. fail to teach or suggest each and every element of the claimed invention, as set forth in, for example, independent claims 36 and 47, Zhu et al. fail to satisfy the criteria necessary to anticipate the claimed invention. Dependent claims 39, 48-51, 53-55, and 58-

[1] http://www.nature.com/nrg/journal/v5/n4/glossary/nrg1315_glossary.html (August 24, 2006)

59 further limit claims 36 and 47, and are neither taught nor suggested by Zhu et al. In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of this rejection.

Rejections under §103(a)

Claim 39 is rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Manger et al. in view of Brown et al. Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

As outlined in detail above, Manger et al. fail to anticipate the claimed invention. Specifically, Manger et al. fail to teach or suggest methods of identifying a pathogenic agent. Brown et al. fail to overcome the deficiencies of Manger et al. Reconsideration and withdrawal of this rejection is requested.

Claims 52 and 60-66 are rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Zhu et al. in view of Braun and further in view of Brown. Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

As outlined in detail above, Zhu et al. fail to anticipate the claimed invention. Specifically, Zhu et al. fail to teach or suggest a method of identifying a pathogenic agent using either information fusion and/or machine learning. Braun and Brown fail to overcome these deficiencies for several reasons.

First, Zhu et al. merely teach a method for comparing information from test sample probes with information from control sample probes to measure the relative expression of the nucleic acids that hybridize to each of the probes. Zhu et al. fail to teach a method for identifying a pathogenic agent using information fusion and/or machine learning. These deficiencies of Zhu et al. are not overcome by references such as Braun and Brown. Specifically, these isolated references teaching particular mathematical and computational models and techniques for machine learning do not teach one of skill in the art how to apply these tools to the problem of identifying pathogenic agents.

Second, absent Applicants' disclosure, one of skill in the art would not have been motivated to combine the teachings of Zhu et al. with the teachings of Braun or Brown. As noted above, Zhu et al. does not teach or suggest utilizing information fusion or machine learning in the context of pathogen identification or in the context of analyzing biological data. Absent such a suggestion, the

skilled artisan in the biological sciences would not have been motivated to combine the mathematical teachings provided by the Braun or Brown references with the teachings of Zhu et al. Zhu et al. does not teach or suggest bringing the powerful mathematical and computational methods, for example the methods taught by the Braun reference, to bear on the problem of processing biological data to identify pathogenic agents. Braun does not teach or suggest the application of information fusion and machine learning methodologies to biological systems. Accordingly, there is no motivation, absent Applicants' disclosure, to combine these references. In accordance with MPEP 2143.01 and with case law,

"obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art." MPEP 2143.01; *See*, *In re Kotzab,* 217 F.3d 1365, 1370 (Fed. Cir. 2000); *In re Lee,* 277 F.3d 1338 (Fed. Cir. 2002); *In re Fine*, 837 F.2d 1071 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347 (Fed. Cir. 1992).

The combination of Zhu et al., Braun, and Brown fail to render the claimed invention obvious. The combination of references fails to teach or suggest the claimed invention. Furthermore, absent the present application, one of skill in the art would not have been motivated to bring the mathematical and computational analysis of Braun and Brown to bear on the problem of identifying and characterizing host-cell responses to pathogenic agents. Reconsideration and withdrawal of this rejection are respectfully requested.

Claims 56 and 57 are rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Zhu et al. in view of Glezer et al. Applicants traverse this rejection and contend that the rejection is moot in light of the amended claims.

As outlined in detail above, Zhu et al. fail to undermine the patentability of the claimed invention. Glezer et al. fail to overcome the deficiencies of Zhu et al. Accordingly, reconsideration and withdrawal of this rejection is requested.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants submit that the pending claims are in condition for allowance. Early and favorable reconsideration is respectfully solicited. Applicants respectfully invite the Examiner to address any questions raised by this submission to the undersigned at 617-951-7000. Should an extension of time be required, Applicants hereby petition for same and request that the extension fee and any other fee required for timely consideration of this submission be charged to **Deposit Account No. 18-1945**, under Order No. MIN-P01-001 from which the undersigned is authorized to draw.

Dated: August 31, 2006

Respectfully submitted,

By _____

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